The Citrus Industry

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SERIOUS LABOR SHORTAGE THREATENS

The Florida citrus industry is threatened with a serious labor shortage when the present shipping season gets into full swing, according to E. F. DeBusk, state supervisor of the farm labor program. At a recent meeting of the Polk County labor advisory committee, Mr. DeBusk stated that Polk county would need thirty thousand additional laborers when the season is fully advanced, and that only about one-half of that number is now considered available.

While Polk county, as the leading citrus producing county of the state, will need a greater number of citrus workers than any other county in the citrus belt, a proportionate shortage of labor is expected in other counties. Just where the remainder of the needed workers are to be found is a serious problem, and one which growers, packers and shippers are now giving due consideration.

At the opening of the shipping season a year ago, growers were confronted with a similar shortage of labor, though by no means as serious as that now confronting the industry. By utilizing every available man, woman, boy and girl in the groves, packing houses and shipping sheds, the industry got by last season with less confusion than had been anticipated, but the situation this season is much more aggravated.

County agents and county labor advisory committees will give every aid possible to growers in need of additional help, and will explain the necessary steps which growers must take to assure jobs and living quarters for imported labor.

GOVERNMENT NEEDS MUCH FRUIT

Florida citrus growers have been advised that the Federal government will require twenty-five million boxes of citrus fruit for lend-lease, military and essential civilian purposes during the present season.

This fruit, embracing 15,000,000 boxes of grapefruit and 10,000,000 boxes of oranges, would be diverted to canning and concentrate plants under a proposed industry committee functioning under a proposed food order.

To fill a need for 4,000,000 gallons of concentrate, Florida will be asked to produce 2,200,000 gallons from 3,500,000 boxes of oranges, and California will be expected to produce 1,800,000 gallons from 3,600,000 boxes of oranges. Another 2,200,000 boxes of Florida oranges will be needed for single strength orange juice. The proposed order, it is anticipated, would require one-third of an estimated Texas crop of 16,000,000 boxes of grapefruit.

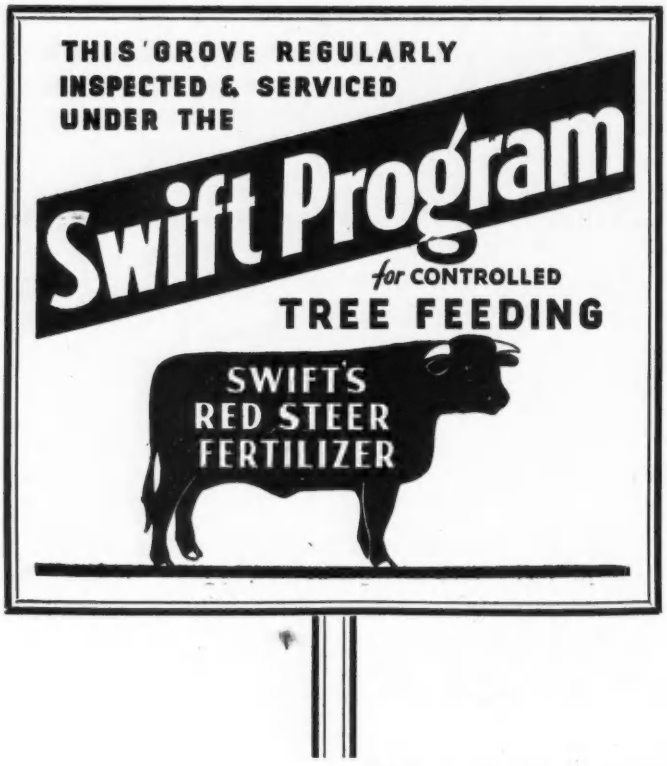
It is indicated that "bottom" as well as "ceiling" prices are contemplated by the government, which would bring returns on fruit sold to canning and concentrate plants commensurate with fresh fruit market prices. The entire price structure is to be discussed by government officials and citrus leaders of Florida, California and Texas at an early date.

If satisfactory prices can be worked out, the government purchase of twenty-five million boxes of citrus fruit for canning and concentrate production should work to the advantage of growers and act as a stimulant to prices of fresh fruit.

H. E. CORNELL

H. E. Cornell, president of Glen St. Mary Nurseries, first vice president of the Florida Citrus Exchange and for many years a leading figure in Florida citrus circles, died recently while on a visit to a brother in Spokane, Wash. Aside from his activities in citrus circles, Mr. Cornell was a leader in civic circles and activities of Winter Haven where for the past thirty years he has made his home. His death is a distinct loss to the industry.

With active shipment of Florida's citrus crop "just around the corner," the industry is threatened not alone with a shortage of labor but, for the first time in history, with a possible shortage of inspection power in the citrus inspection service. Whereas previously inspectors began showing up early in August in anticipation of jobs, this year they have been slow about reporting. However, with the heavy fruit crops now gathered, it is anticipated that an adequate number of veteran inspectors will also be available.



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The Effect Of Phosphatss Upon The The Fixation Of Zinc And Copper In Florida Soils

By VERNON C. JAMISON,
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At Meeting Florida State Horticultural Society

The idea still persists among research workers and growers that soil phosphates fix zinc and copper in Florida grove soils. Perhaps one reason for this is that evidence to the contrary (1, 2) has been mentioned only briefly in publications concerned with other problems. No one has taken the time or trouble to devote a publication wholly to the matter. Until recently analytical methods for copper and zinc were so crude that research workers were forced to apply excessive amounts in order to find what remained in solution. For example, Jones, Gall, and Barnette (3) studied the effect on zinc of applying 10 to 50 tons of superphosphate in conjunction with 860 pounds of zinc sulfate per acre.

Peech (1) has shown that the removal of acid soluble phosphates from a Norfolk find sand did not reduce its capacity to fix zinc or copper against an extraction with a salt solution (using N NaC1). It has been found since that several extractions with a salt solution will continue to remove much more copper or zinc than can be dissolved with water. However, for practical purposes one might consider the amounts left after the first extraction to be so strongly held as to be essentially unavailable to the tree. These quantities of zinc and copper will be called "fixed" in agreement with Peech's usuage.

Soils are sure to vary in capacity for fixing zinc and copper. What applies to one soil may not hold for certain others. It was decided to adapt the methods used by Peech to a survey of soils commonly planted to citrus in Florida. The soils studied included several sandy soils from the central ridge section, a Parkwood from Bradenton, a custard apple muck, and a sawgrass peat from the Glades. Portions of two samples were washed free of acid soluble phosphates. Others held from 49 to 1740 pounds of acid soluble phosphorus per acre. The soil pH values varied from 3.68 to 6.65. Samples of each soil were split in two portions. Sixteen percent superphosphate was added at the rate of 500 pounds per acre to one portion and no phosphate to the other. Copper and zinc sulfates were added in solution at rates of 100 and 60 pounds per acre, respectively. After 24 hours the amounts of soluble and fixed zinc and copper were determined. The superphosphate had little or no effect upon the fixation or solubility of zinc and copper (Table 1). However, if a difference of .5 percent of the zinc and copper added is taken as significant, then with 12 soils, superphosphate has actually decreased the fixation of zinc in 7 and of copper in 4 soils but has increased it in only 3 for zinc and 2 for copper. Superphosphate increased the solubility of copper in 2 and decreased it in 2 soils, but it increased the solubility of zinc in 7 soils and decreased it in only 2.

These effects seem curious in the light of what is usually taken for granted about the solubility of zinc and copper and copper phosphates. It may be a little hard to understand how superphosphate can actually increase the solubility of zinc and copper. Peech (1) clearly demonstrated that pH is a highly important factor in determining the degree to which zinc and copper are fixed. The lower the pH, the lower the fixation. The calcium supplied in superphosphate not only tends to displace copper and zinc from the soil but it displaces acidity into solution, lowering the pH, and in many cases mobilizing significant amounts of zinc and copper. The whole truth of the matter is doubtless quite complex, but the fact remains that moderate and practical amounts of superphosphate do not reduce the solubility

or exchangeability of zinc and copper in the soil.

From the data (Table 1) it may appear that acid washing the Blanton soil has lowered its capacity to fix copper and zinc. The effects can actually be attributed to pH and not to removal of soil phosphates. For when the pH was adjusted to the same level by additions of lime the acid-washing treatment increased the fixing power of this soil. This was probably due to the removal of strongly fixed elements such as iron and aluminum as well as native zinc and copper, liberating fixing surfaces or points in the soil. Anyway it is clearly evident that substances other than phosphates are responsible for zinc and copper fixation in these soils.

Other laboratory studies have been made to determine the relative fixation of zinc and copper in the presence and absence of phosphates added in solution to soils. When soluble phosphate was added to a soil equivalent to 2,000 pounds per acre of fertilizer containing 6 percent water soluble phosphoric acid, there were slightly smaller quantities of copper fixed in its presence than in its absence, whether amounts of 100, 1,000 or 2,000 pounds of copper sulfate were applied. The equivalent of a 20,000-pounds-per-acre application of the same fertilizer caused more zinc to be fixed in a Blanton fine sand than in a no phosphate check only after zinc sulfate was added in excess of 750 pounds per acre. In this experiment the pH was varied with lime additions so that comparisons could be made at the same pH values. As the pH dropped below 5.5 the effect of the phosphate was noticeable with applications of zinc sulfate a little less than 750 pounds per acre. As the pH went higher the phosphate effect could be observed only at zinc sulfate applications somewhat higher than 750 pounds. In other words, the effect of phosphate became noticeable when the application was about 20 times that normally applied in conjunction with about 5 times as much zinc as would be practical. It seems clear that in this soil and the others tested copper and zinc are fixed by forces stronger than supplied by phosphates.

There is a group of plots in an orange grove set on sawgrass muck at Davie where it is necessary to apply copper to prevent ammoniation. Neller and Forsee (4) found that when the phosphate application is doubled above that ordinarily used, the tendency toward ammoniation is noticeably increased. It has been felt that here is one place where copper is tied up as insoluble phosphate in the soil. To test this, a sample of virgin soil was taken just outside the plots and brought to the laboratory. The sample was divided into four equal parts. Copper sulfate was added in solution equivalent to 373 pounds per acre to the soils as well as to a check containing no soil but the same amount of superphosphate as the 5,000-pound soil application. The copper was 149 times more soluble in the presence of superphosphate alone than soil alone (Table 2). The heavier applications of superphosphate to the soil actually increased the solubility of copper. This was probably due to the replacing action of the calcium from the superphosphate. It is also interesting that the copper was considerably more soluble in the presence of excess lime than in the soil. Although the common basic inorganic compounds of copper may be considered as practically insoluble, they are many times more soluble than copper in fixed forms in the soil. It is also of interest that practically none of the insoluble copper was extracted from the soil with a salt solution except where superphosphate was added. Probably the discrepancy between the copper

TABLE 1. The Solubility and the Fixation of Zinc and Copper Applied to Several Soils in the Presence and the Absence of Superphosphate.

Soil Description	Location	Analyses Before Treatment		% Zinc 1 Soluble In Water		% Copper 2 Soluble In Water		% Zinc 1 Fixed		% Copper 2 Fixed	
		Soil pH	Acid Soluble P	No Phosphate Applied	Phosphate 3 Applied	No Phosphate Applied	Phosphate 3 Applied	No Phosuhate Applied	Phosphate 3 Applied	No Phosphate Applied	Phosphate 3 Applied
Blanton Fine Sand	Lake Alfred	5.75	300	5.0	8.3	2.3	2.1	79	78	98	98
Acid-Washed Blanton Fine Sand	Lake Alfred	4.08	0	18.3	19.3	4.9	2.3	65	65	77	81
Norfolk Fine Sand	Lake Alfred	5.55	198	5.3	13.3	1.1	1.4	42	43	96	97
Norfolk Fine Sand	Lake Alfred	5.98	1740	1.6	4.0	0.5	0.4	88	87	93	93
Virgin Norfolk Fine Sand	Lake Alfred	4.80	122	16.0	7.7	2.0	2.0	47	49	93	91
Eustis Fine Sand	Tavares	6.20	480	1.3	3.3	1.1	1.0	90	86	93	93
Eustis Fine Sand	Eustis	6.39	1480	1.0	1.3	6.4	5.0	91	90	95	95
Virgin Gainesville Fine Sand	Dade City	6.65	49	1.0	1.3	0.3	0.1	89	87	97	91
Parkwood Fine Sand	Bradenton	5.74	384	3.3	5.0	2.6	2.4	72	70	93	91
Acid-Washed Muck	Lake Alfred	3.68	0	5.0	16.6	0.8	1.4	52	52	89	97
Custard Apple Muck	Clewiston	6.45	134	1.6	1.6	1.8	2.5	97	94	98	98
Sawgrass Peat	Davie	5.98	202	1.6	6.6	1.1	1.1	84	86	96	96

1. From a 60-pound per acre application of zinc sulfate.
2. From a 100-pound per acre application of copper sulfate.
3. At the rate of 500 pounds 16 percent superphosphate per acre-six inches.

NOTE: An acre-six inches is taken as 2,000,000 pounds for the sandy soils, 600,000 pounds for the mucks, and 300,000 pounds air-dried soil for the peat.

extracted with water and with salt solution from the soil receiving no superphosphate is due to the slight dispersion of soil organic matter. Similar results to these were obtained with a sawgrass peat from Belle Glade.

It would seem from these data that some theory other than the fixation of copper as phosphate should be used to explain the crop responses. Nitrogen is probably excessive in supply while phosphorus and copper deficiencies limit growth. With the application of superphosphate, growth and production increases, aggravating the deficiency of copper. This explanation is perhaps a little too simple to be the whole story, but the key to the problem lies in finding a better nutritional balance.

If phosphate were effective in fixing copper in the soil, soils high in phosphate should retain larger amounts of copper over a period of time than the same kind of soil low in accumulated phosphates. In what is known as the Nitrogen Source Block at the Citrus Station there are two rows of plots adjacent to each other. One row has received heavy applications of steamed bone meal while the other row received superphosphate. The total phosphorus is now more than twice as high and the acid soluble phosphorus about 10 times as high in the bone plots as in the superphosphate plots. In 1934-35 270 pounds of bluestone per acre were applied to these adjacent plots. In the fall of 1941 soil samples were taken, composites being made of 16 borings for each tree plot. These were analyzed for total copper. No consistent effect of the high phosphate on retention of copper was found (Table 3). Two adjacent plots held about the same amount; in one pair the superphosphate plot was higher in copper and in the other the bone plot held more. Of the three bone plots, the one having the highest content of phosphorus held the least and the one having the lowest phosphorus held the most copper. Although these plots were not designed especially to study copper retention in the soil, this information indicates there is no effect of rather excessive quantities of phosphate in

(Continued on Page 12)

TABLE 2. The Solubility of Copper Added to Superphosphate and Lime Compared With Copper Applied to Virgin Sawgrass Muck From Davie With and Without Superphosphate.

Treatment	Lbs. of Bluestone Applied per Acre 1	Soluble Copper Expressed as Lbs. of Bluestone per Acre	Copper Extracted with N NaCl Expressed as Lbs. of Bluestone per Acre	Relative Solubility of Copper
Copper Alone 2	373	373		
Copper Added to Soil	373	2.4	0.1	1
Copper Added to Soil with 500 lbs. Superphosphate	373	2.4	9.1	1
Copper Added to Soil with 2000 lbs. Superphosphate	373	6.1	8.9	2.5
Copper Added to Soil with 5000 lbs. Superphosphate	373	10.2	8.9	4.3
Copper Added to Superphosphate 3	373	357		149
Copper Added to Superphosphate Plus Lime 4	373	217		90
Copper Added to Lime 5	373	144		60

1. Taking 300,000 pounds air-dried soil as an acre-six inches.
2. Same amount of copper in solution as added to soil samples.
3. Same amount of copper sulfate and superphosphate as added to soil sample receiving highest superphosphate application.
4. Same amount of copper sulfate and superphosphate as added to soil sample receiving highest superphosphate application plus the equivalent of a 1000-lb. lime application.
5. Same amount of copper sulfate as added to soil samples in the presence of a 1000-lb. lime application.

TABLE 3. The Residual Quantities of Copper Remaining in the Surface Six Inches of Soil in Adjacent High and Low Phosphate Citrus Plots.

Tree No.	Source of Phosphate	Total Phosphorus in Soil in lbs./Acre	Lbs. Bluestone Applied per Acre in 1934-5	Copper found in 1941 expressed as lbs. of Bluestone per acre
K-11	Bone Meal	1315	270	73
K-13	Superphosphate	425	270	104
C-11	Bone Meal	1025	270	99
C-13	Superphosphate	410	270	94
G-11	Bone Meal	863	270	151
G-13	Superphosphate	285	270	86

A Resume Of Feeding And Spraying Citrus Trees . . . From A Nutritional Viewpoint

By DR. A. F. CAMP
Assisted By The Staff of the Citrus Experiment Station, Lake Alfred, Florida

(Concluded from last issue)

Spray Program

In modern citrus growing in Florida the spray schedule is necessarily an integral part of the production program for it consists of more than disease and insect control measures. The following spray schedule is designed to complete the fertilizer program above described, and the two together constitute a complete production program. Essentially this spray schedule is Schedule B in the Better Fruit Program but is discussed below in order to clarify the reasons for many of the recommendations.

No. 1 Dormant Spray

This application includes 3 pounds of zinc sulfate, 2 gallons of liquid lime-sulfur (or its equivalent in dry lime-sulfur), and 8 pounds of wettable sulfur to the 100 gallons. This spray is applied in January or February ahead of the start of growth and is applied to all trees whether or not the fruit has been picked. This spray furnishes zinc to the tree at a time when it gives better results than a post-bloom zinc spray, reduces rust mites before they can damage the coming crop of young fruit, requires less material than a post-bloom spray because the new growth that will have to be covered in a post-bloom spray has not yet appeared, leaves no residue on the young leaves to favor scale buildup, and spreads out the spray schedule over a longer period so as to ease the pressure on equipment and labor in large operations. The chief opposition to such a dormant spray arises from those who dislike putting sulfur on trees with no fruit plus the feeling that it calls for an extra spray. As a matter of fact, it does not call for an extra application since Thompson (unpublished data) has found that 2 sulfur sprays are almost always required between the January 1 and June oil application regardless of whether both of them are post-bloom or whether one is pre-bloom and the other post-bloom. In his experiments the latter combination has given better control of rust mites during the summer than 2 post-bloom sprays (unpublished data). Considering, therefore, the advantages previously mentioned, it is obvious why we are stressing the dormant spray, particularly at a time when machinery and labor are short and plenty of time is needed to get over large acreages.

It should be noted that 3 pounds of zinc sulfate to the 100 gallons is recommended. Smaller poundages are frequently recommended by others but the experiments have indicated that this is generally inadvisable. When the poundage is reduced to 2 pounds there is danger of greening ripe Valencias due to a vegetative response, whereas we have been able to use 3 pounds year after year and produce fine-colored Valencias without difficulty. This trouble with the Valencias is probably due to the effect of the lower poundage "running out" before the end of the year so that the new application is made on deficient trees with the inevitable vegetative response.

Where zinc is to be used in other sulfur applications as a sticker, the amount in the dormant spray may, of course, be reduced. This has been done frequently in the past, but has somewhat lost its point due to the introduction of dinitro-o-cyclo-hexyl phenol for use on purple mites. This material should not be used in combination with lime, lime-sulfur or other alkaline materials; not that alkaline materials in combination with it will cause burn but rather that its effectiveness is lost. The most common time for purple mite control is at the time of the melanose spray; and if zinc and lime are used in this spray, then the use of dinitro-o-cyclo-hexyl phenol is eliminated. For the above reason it seems advisable to put all the zinc in the dormant spray so that no lime will be needed in the melanose spray.

No. 2 Post-Bloom Melanose Spray

About two weeks after the petals have fallen the copper and wettable sulfur combination spray should be applied to control melanose and supply copper to the tree. This spray may be either 3-3-100 bordeaux plus 10 pounds of wettable sulfur or proprietary copper plus wettable sulfur. The relative values of the various copper sprays have been discussed by Voorhees (29) at this meeting and need no further discussion here. If purple mites are present, a neutral copper plus 2/3 pound of a proprietary insecticide containing 40 percent dinitro-o-cyclo-hexyl phenol as the active ingredient should be used instead of bordeaux. The dinitro compounds are relatively new and recommendations for their use will probably be further modified.

The copper spray is important both because of its value in melanose control and its nutritional value and should not be omitted just because it is believed that no melanose control will be needed. In our plots the copper spray has been of great value in maintaining consistent production. As previously mentioned the application of copper only in the fertilizer has not been so satisfactory as the copper spray plus less copper in the fertilizer. An additional factor that should be considered is the fact that for several years we have had a late bloom and consequently the fruit has not been immune to melanose when the summer rains started and extensive infection has taken place in June where a copper spray has not been used.

No. 3 Oil Spray

An oil spray is recommended between May 15 and August 1 for grapefruit and June 1 and July 15 for oranges. Where trees are in good condition and receiving a regular fertilizer and spray program the oil spray is definitely recommended and the practice of waiting to see whether scales will develop is not recommended.

So many seem to lack an understanding of the factors leading up to the present scale situation that I am going to review some of the pertinent facts which Thompson (26, 27 and 28) and others have brought out in the course of their research work on this problem. In the first place, the statements made by many that they did not have scale trouble before all of the new-fangled sprays and fertilizers were introduced is definitely correct. Plots at the station receiving only nitrogen, phosphorus, and potash with no magnesium, manganese, copper, or zinc, involve no scale problem even with out an oil spray. The main difficulty is that these trees produced little fruit, were severely injured by the cold in January, 1940, (Lawless and Camp (12)), November, 1940, (Lawless 12)), and March 1943, while trees fertilized and sprayed according to modern standards produced heavy crops and were little damaged by the cold under identical conditions. The fact is that all of us would like a 1943 grove equipped with a 1930 model scale problem, but this combination is so far unobtainable. The reasons for this are several and are readily understood when shorn of some of the misconceptions that have been associated with the problem. The original idea was that the copper in the copper spray killed the friendly fungi; later the zinc spray was blamed for most of the difficulty and even though it is almost worthless as a fungicide was still blamed for killing the friendly fungi. In fact, the friendly fungi have dominated the picture to such extent that work by Thompson started in 1932 (23, 24, 25, 26 and 27), Ziegler (unpublished) in 1935, Spencer and Osburn (22), and Osburn and Spencer (16) showing that the buildup

of scales following a copper spray is closely related to the amount of residue in the spray and that other non-fungicidal residues such as lime clay, etc., gave the same sort of scale buildup, has been generally overlooked. It had been recognized in the early days of the citrus industry that lime or clay dust from roadsides resulted in scale buildup bu this has been generally overlooked. All of the research work would indicate that residues which give a foothold for scale crawlers are a major factor in scale buildup following zinc and copper sprays and if lime, clay, or any other inert materials were used in place of copper or zinc the results would be about the same. If this were all of the story it would be relatively simple, but Thompson (27 and 28) has found that trees on a N-P-K program of fertilization are not severely affected by scales even though sprayed with copper and zinc but that when liberally supplied with magnesium, manganese, and copper through the soil they are severely attacked by scales even though they have not been sprayed with copper and zinc. This work has shown that scales do not thrive on frenched or bronzed leaves, and the lack of shade in deficient trees due to the loss of leaves also helps to keep down scales. There is also considerable indirect evidence that some of the increase in scales following zinc and copper sprays is due to improved leaf and tree condition as well as to residue. The work up to now would indicate that the biggest factor in the scale problem is the improved tree and leaf condition incident to the correction of deficiencies and that residues from sprays are secondary although an additional problem. Exclusion of copper and zinc sprays has not eliminated oil sprays in plots at the Citrus Experiment Station which are well supplied with magnesium, manganese, and copper through the soil: and the same has been true in commercial groves.

In the timing of oil sprays certain things should be remembered. Thompson's work has shown that oil sprays applied before June 1 on oranges are likely to cause a burn which will not show up immediately but will be noted after the fruit colors, so oil spraying on oranges should not start before June 1. Grapefruit can be sprayed in May with safety, however. Oil sprays during May, June and up to July 15 affect the coloring of fruit very little; but oil sprays applied in August may make it impossible to color fruit in a coloring room, and may also greatly delay coloring in the field. It will be seen that the selection of a time for an oil spray is important and the above points should be kept constantly in mind.

One additional caution about oil spraying should be repeated even though Thompson has voiced it many times. This advice is to spray thoroughly inside as well as outside the tree, wood as well as leaves. Of the many failures to get control, the most common cause has been lack of thorough coverage, although commonly the blame is laid on the oil used rather than on the method of spraying. This is a very human reaction but a grower should study his methods of oil spraying thoroughly and carefully and try to get the very best coverage possible. Spraying methods which were successful on the common types of trees 10 or 12 years ago will not be successful on the heavily foliated trees common today.

No. 4 Sulfur Spray

If the first 3 sprays are applied properly, as indicated, it will not be necessary as a usual rule to apply more sulfur before late summer, usually in late August or early September. Examinations for rust mites should be the basis for timing this spray as many factors can influence the buildup of rust mites. On oranges the preferred application at this time is a spray of straight wettable sulfur as this is least liable to burn the fruit. Dust may be used but the methods and equipment commonly used in dusting frequently result in parts of the tree being coated with excessive amounts of sulfur and, if the weather is hot, burn may be serious. We prefer not to apply any lime-sulfur to oranges at this time although it probably can be applied to Valencias at 1-100 plus wettable sulfur. On other varieties it is definitely dangerous. On grapefruit it may be used if desired but its chief value is in giving a little better sticking of the wettable sulfur if the weather is rainy.

No. 5 Sulfur Spray

If the 4 sprays noted above are applied properly as indicated, there will usually be no necessity for further sulfur until the dormant spray; but if rust mites come up, a sulfur spray or dust may be necessary. This can be determined by checking rust mites in the usual way.

Spray Schedule As A Whole

The spray schedule above is based primarily upon the same philosophy as the fertilizer schedule, i. e., the controlling of troubles before they become serious rather than their correction after they have become acute. The dormant sulfur spray is exactly in line with this philosophy. If it is omitted and 2 post-bloom sprays used instead, the mites build up on the leaves before growth starts: and by the time the melanose spray is applied, mites are present in tremendous numbers. Since the killing by a spray is more or less on a percentage basis, a considerable infestation remains after the effects of the spray have worn off. The result is a rapid buildup and even though another sulfur is applied rust mites are too numerous at the time for the oil application for the oil to adequately control them. On the other hand, a dormant sulfur spray catches the mite ponulation at its lowest level and reduces it almost to the vanishing point; before it builds up much it is again reduced by the post-bloom spray. The result is that when the time for the oil spray arrives there is a much smaller population of mites than where 2 post-bloom sprays are used. Since an oil spray is quite effective against a small population of mites but ineffective against a heavy population, the groves receiving the recommended dormant spray plus one post-bloom spray are almost free of rust mites after the oil spray has been applied; whereas the groves receiving the customary 2 post-bloom sprays are likely to require a sulfur as quickly as possible after the oil spray. The net result is that the grower is likely to find himself using 5 sprays for the work that 4 would do if he had used the dormant spray, and in constant difficulty throughout the year due to overlapping spray periods, shortage of equipment, etc. The new program is designed to forestall those things which we have found are common troubles, and in large operations in particular this is of the utmost importance. A man with 10 or 20 acres and a duster can perhaps keep track of rust mites and dust whenever necessary, but a large operator must move on schedule and must be certain that his groves will remain in good condition from one application to the next.

Modifications of this spray schedule to meet special conditions are generally covered in the Better Fruit Program.

Modifications

The program as it has been outlined is primarily for the sandy soils which are still acid in reaction, and these constitute the major part of the citrus acreage of the state. No attempt will be made within the scope of this paper to present a detailed program for all the soils in the state but certain general modifications will be indicated here which will help to fit the program to other conditions than those outlined.

Soils Containing An Excess Of Limestone

There are a great many groves in the state which are on sandy soils but which have been heavily limed to the extent that the pH in the top soil is consistently above 6.5, and the soils contain a great amount of unreacted limestone. On such soils it is undesirable to use dolomitic limestone both because it tends to raise the pH still further and because it does not react well at the existing pH. Also, the availability of manganese, copper, and probably phosphate is greatly reduced. On such soils it has been found desirable to use only soluble magnesium at the ratio of 1:1 with nitrogen. Strictly soluble forms such as sulfate of magnesium or sulfate of potash-magnesia are favored over the alkaline forms such as the oxides in order to keep the fertilizer as acid as possible. It is usually found desirable also to use manganese in the spray at 3 pounds per 100 gallons instead of in the fertilizer, at least until the pH of the soil has been depressed to 6.0 by the use of acid fertilizers. The manganese may be combined with the zinc in the dormant spray or with the copper in the post-bloom spray, but the former is preferable because lime may not be wanted in the latter spray. Copper in the fer-

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Frozen Concentrates... Post War Possibility

The Florida Citrus Commission, which is thinking hard these days about ways to market more fruit after the war, has come out with a new idea—frozen citrus juice concentrates.

Concentrate any of the citrus fruit juices or mixtures of them to one third of their original volume and distribute in small frozen packages, like other frozen foods, suggests the Commission, so all the housewife has to do is add water.

The idea occurred to Dr. L. G. MacDowell, the commission's research director, in considering the problems in getting housewives to use orange juice concentrates in its present form. Florida has developed an immense production of this product for our armed forces and allies, for which new outlets will have to be found after the war.

Reviewing attempts to prepare and market frozen single-strength orange juice, he found this product had not become important commercially because of the problem of distributing large packages of frozen juice and the trouble in melting quickly for serving. When put together this way, the problems of concentrates and frozen juices answered themselves.

"What could be simpler," said Dr. MacDowell, "than preparing a concentrate of such strength that after being quick-frozen it could be reconstituted by the simple addition of enough tap water to quickly melt it, at the same time using the frozen concentrate to cool the resulting mixture to a palatable temperature?"

Discussing the idea with Dr. A. F. Stahl of the University of Florida agricultural experiment station at Gainesville, he found that Dr. Stahl had already prepared a frozen orange juice concentrate by freezing single-strength juice to a slush and then removing the pure ice crystals by centrifuging. He had samples of frozen juice 13 months old.

Dr. MacDowell reports that orange juice reconstituted from Dr. Stahl's frozen concentrate was remarkably similar in flavor to fresh Valencia orange juice. Dr. Stahl's analysis of the frozen juice, after six months' storage showed it contained 90 percent of the original vitamin C content. Dr. MacDowell thinks that under practical operating conditions there would be practically no loss of vitamin C.

Dr. Stahl is preparing samples for the Commission of 3-to-1 frozen concentrates of orange juice, grapefruit juice and a 50-50 mixture of the two. The juice may be concentrated by any means, but Dr. MacDowell believes that juice which is concentrated by freezing and centrifuging, as done by Dr. Stahl, has superior qualities.

"Undoubtedly anyone who goes into the manufacture of such a product will have operating problems to overcome by experimentation," says Dr. MacDowell. "However, the process is so simple that I would not expect much difficulty in this respect. It is really a problem for a refrigeration engineer.

Dr. MacDowell says he will assist responsible persons interested in manufacturing frozen citrus juice concentrate because he believes it offers a new method of distribution which will help Florida growers sell more fruit.

Control Of The Pecan Tree Borer...

J. R. WATSON, Entomologist,
Florida Experiment Station

Pecan trees along with other deciduous trees are commonly attacked by three different types of borers. These same borers attack a large variety of shade trees, especially oaks, and the remarks we shall make today apply well to these trees although we have especially in mind pecan trees. The most serious of these borers is the round headed borer. This makes burrows of a considerable diameter, as big as a small lead pencil, leading directly to the center of the tree, even a live, healthy tree. When they reach the center of the tree they work up and down doing a great deal of damage. Their presence is shown by sawdust thrown out from the burrow or by sap flowing out. This type of borer, although more serious, is most easily controlled. With a medicine dropper squirt into each hole a little carbon bisulfide, the same material we use for fumigating corn, immediately stopping up the entrance to the burrow with moist clay, gum, putty, turpentine, wax or other material. The fumes of this material will penetrate the burrow and kill the worm inside. If they are not controlled they will grow until they are full sized and then crawl out to near the entrance of the burrow, where they will go into the pupa stage and from this situation the adult beetle can easily emerge, usually in the spring of the year to start another generation. Sometimes a wide-headed nail driven into the hole will dam up the flow of sap and drown the borer.

Another type of borer known as the flat-headed borers work just under the bark of the tree and may work all around the trunk of a small tree, thus girdling it. These borers are not as apt to attack a

healthy tree, but are apt to do much damage to a tree injured by some other cause. A newly transplanted tree or trees whose bark has been unduly exposed to sunlight with the resulting sunscald is most apt to be attacked. The best way to eliminate these borers from the trees is to cut them out with a knife taking pains not to cut crosswise of the grain but lengthwise with the trunk of the tree.

The third type of borer, perhaps the most common of all, makes small holes in the bark, which looks as though the bark had been peppered with buck-shot. For this reason they are called "shot-hole" borers. Usually when a tree has been invaded by these borers it is a very poor life insurance risk. Sometimes, however, if the injury can be discovered in the early stages of the invasion, whitewash on the trunk and larger limbs may save the tree Make the whitewash quite liquid so that it will fill up all the cracks and crannies of the bark. To make it stick better add a handful of salt to each three gallons of the whitewash. These borers, like the flatheaded borers, will not ordinarily attack a healthy tree. The flow of sap from a healthy tree will drown them in their burrows, so the most important thing of all in combatting these borers is to keep the trees in a healthy, growing condition.

Trees planted along our streets and in our yards are usually under unnatural conditions. Sidewalks, pavements, and the foundations of houses interfere with the proper development of the roots, and furthermore the leaves are usually raked up and carried away or burned. Leaves are natural fertilizer of the tree, and also act as a mulch to keep the ground from drying out excessively during dry periods, so that a tree under these conditions needs extra care. To compensate for this loss of fertilizer, commercial fertilizer should be added from time to time, and the trees should be watered during dry periods.

Another important measure is to promptly cut down any tree which these borers have killed, or one that is evidently going to die. This will diminish the number of borers in the neighborhood, which may attack any other tree which may not be perfectly healthy. Even a healthy tree, if subjected to too frequent attacks of these borers due to great abundance of them in the neighborhood, may finally have its vitality so lowered as to succumb to their attacks, even if the first invaders were drowned by the flow of sap. This applies equally well to pine trees as to deciduous ones. Any pine tree which is dead or evidently dying, whether from causes just enumerated or from lighting, or other causes, should be promptly cut down and cut up into fire wood. If the wood is cut up into pieces of stove wood size and piled out in the sun it will dry out so promptly that these borers will not long find conditions favorable for their development, but if allowed to stand or allowed to lie on the ground after being cut down and not cut up, or if cut and piled in the shade, it will dry out slowly and conditions will for a long time remain favorable for the development of the borers. The presence of the borers can usually be detected by the sap issuing from the wound they make, or piles of saw dust will accumulate around the entrance to the burrow or around the base of the tree.

Young trees recently transplanted should have their trunks protected from the direct rays of the sun, particularly the noonday sun. Standing a board upright on the south side of the tree will accomplish this purpose, or one may drape Spanish moss or other material around the trunk of the tree.

The Agricultural Licensing And Bonding Law -

By NATHAN MAYO
Commissioner of Agriculture

Every farmer in Florida should know that we have a law made to protect him against fraud and loss in the sale of his farm products. This law was passed by the Legislature of 1941, and is known as the Agricultural Licensing and Bonding Law. This Act requires certain dealers in agricultural products to obtain a license from the State and file bond as a guarantee that farm products bought by them direct from farmers will be paid for. This Act does not apply to Citrus Fruit and Dairy products, nor to dealers who buy for cash. Checks are not classed as cash. Should the dealer give a bad check or fail to to properly account for the farmer's produce when handled on a commission basis, the farmer may file claim with the Commissioner of Agriculture against the dealer, and the dealer of his bondsman will be held accountable and required to make payment of the claim. This Act, therefore, protects every producer against unscrupulous dealers, rubber check dispensers, and various sharks who hitherto have feasted and fattened upon unsuspicious farmers who trusted them.

Losses amounting to tens of thousands of dollars have come to Florida growers in the past years who fell into the hands of the shysters. These losses have steadily declined since the passage of the Licensing and Bonding Act two years ago. Last year 700 dealers qualified under the Act—100 of them being out of state concerns. These men, mindful of the moral obligation to treat farmers right, have shown themselves to be ethical and trustworthy by making bonds and obtaining licenses, thus giving their customers complete assurance of a square deal.

Unfortunately, however, it appears that many farmers continue to grow crops and sell them to strangers on faith alone. Consequently, some of our producers continue to lose the product of their toil by taking bad checks or accepting promises not backed up by a Surety Bond and a good state law.

The purpose of this statement is to urge every farmer in Florida to sell his products only to and thru dealers who hold licenses under this protective Act, or to dealers who pay actual spot cash. Producers who continue to blindly trust the unlicensed and unbonded dealers do so at their own peril. May I urge any farmer who is in doubt about any dealer to write to the Department of Agriculture in Tallahassee and we will gladly inform him whether such dealer has obtained a license and made bond required under the law. Copy of the law will be mailed upon request.

I do not hestitate to advise farmers in the State to make certain that the man who buys their farm produce, either here or at some point outside of the State, has fully complied with the law. When a dealer receives his license, a card is issued to him giving his name, license number, and date when license expires. A farmer before selling any produce should demand that the dealer show this card or his license. Why continue to risk your vegetables, fruit, eggs, poultry and livestock in the hands of unlicensed dealers whose checks may be like rubber and whose promises may be like pie crust?

Fire Protection Has Special Significance . . . For Florida Farmers

Gainesville, Fla.—Fire Prevention Week, beginning Oct. 3, is a week of special significance to farmers, says A. P. Spencer, associate director of the Florida Extension Service.

He says the importance of fire prevention to the farmer, particularly in a time of manpower shortages and the need for farm buildings, is made evident by the fact that 10 lives were lost in farm fires every day in the United States and a farm building catches fire every 15 minutes.

Because it was difficult even in peace-time for organized fire-fighting help to reach the scene of a farm fire in time to bring it under control and because of acute manpower shortage now universally being felt in rural areas, Mr. Spencer urges farmers to make their property as fire-safe as possible as their part of Fire Prevention Week.

He calls attention to eight hazards listed by the National Fire Prevention Association as causes of the majority of farm fires and that can be eliminated. "Every farmer should seek out these hazards and lay plans to do away with them," he says.

1. Flammable roofs—should be replaced with fire-resistant materials.

2. Defective heating systems—Chimneys and flues should be cleaned yearly and repaired if they are faulty.

3. Electrical equipment— Keep cords in repair. Disconnect all appliances immediately after using.

4. Matches and cigarettes — should be extinguished completely before being discarded. Matches should be kept in safe containers beyond the reach of small children, and no smoking should be permitted around combustible materials.

5. Gasoline and kerosene — should be safely stored in clearly marked metal safety cans and handled with care at all times.

6. Rubbish—should be cleaned out constantly and burned only on windless days in protected containers.

7. Spontaneous ignition of hay —All hay should be properly cured before being placed in the mow, proper ventilation should be provided, and inspection made regularly for signs of heating.

8. Lightning — All farm buildings should be equipped with properly installed and well-maintained lightning rods.

THE EFFECT OF PHOSPHATES UPON THE FIXATION OF ZINC AND COPPER IN SEVERAL FLORIDA SOILS

(Continued on Page 5)

this soil in tying up copper. The soil fixes it regardless of high or low phosphate.

In conclusion, for several soils taken from different parts of peninsular Florida little difference has been found with regard to the fixation of copper and zinc in the presence and the absence of superphosphate. In fact, the greater number of the soils studied fixed more zinc or copper when no superphosphate was applied. The forces which retain copper and zinc in these soils are far stronger than those

holding copper or zinc as phosphates or basic compounds ordinarily considered insoluble.

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Morn That 1,600 Attend State 4-H Camps This Year

Gainesville, Fla.—More than 1600 rural boys and girls attended Florida's three 4-H club camps during the summer season which closely recently, R. W. Blalock, boys club agent with the State Agricultural Extension Service has

In a report to A. P. Spencer, vice-director of the Extension Service,, Mr. Blacklock said 1,643 boys and girls spent five-day periods at Camps Cherry Lake, Timpoochee, and McQuarrie, or 698 more thn attended in 1942. Of the total number attending the camps this year, 89 were 4-H boys and girls from Georgia who attended Camp Cherry Lake.

Mr. Spencer and Mr. Blacklock expressed satisfaction over the increase in the number of this year's campers, as they considered the camp program of instruction, recreation and training more important than ever before in view of war-time conditions. Every effort was made by camp directors and staffs composed of specialists to impress upon the farm boys and girls the importance of producing as much food as possible, conserving and preparing food properly, and of doing as much as possible to help in the war program. Physical fitness was also stressed, with examinations and calisthentics on the daily routine. Campers also attended inspirational meetings to hear talks by extension and other workers and to discuss their activities in connection with the war program.

A RESUME OF FEEDING AND SPRAYING CITRUS TREES FROM A NUTRITIONAL VIEWPOINT

(Continued from page 7)

tilizer should be raised to 1 percent, and in particularly bad cases of over-liming bordeaux should be used instead of neutral copper until the grove is back in good condition and bearing properly.

In the coastal regions there are many grove soils which naturally contain a great excess of lime, and the above remarks apply to them also. Most of these groves contain lime in the form of marl and many of the marls contain a fair amount of magnesium, so the amount indicated above (1:1) will be sufficient but in a few cases it has been found necessary to supply even more magnesium than indicated. This is probably due to the great excess of calcium in the soil where the marl does not contain magnesium to any extent and the excess of calcium tends to repress the availability of the magnesium to the tree.

Rootstocks Other Than Rough Lemon

On the lighter soils rootstocks such as sour orange, sweet orange, grapefruit, and Cleopatra mandarin, which are not too well adapted to the soil conditions, have been found to require considerably more fertilizer in proportion to yield than rough lemon stock. This is probably not true to the same degree when these stocks are used on soils to which they are thoroughly adapted. although grapefruit stock, in particular, has always been found to require heavy fertilization in proportion to yield when the top was orange or tangerine. Trees on stocks which are not too well adapted to the soil on which they are planted are also frequently more severely affected by deficiencies than trees on well adapted stocks; therefore, they should be closely watched for various deficiency symptoms and the proper adjustment made in the fertilizer program to take care of any deficiencies that appear.

Areas In Which Grapefruit Scab Needs To Be Controlled

The spray schedule used in these areas, which are mostly coastal areas, should be adapted from schedule A in the Better Fruit Program and will include both a pre-bloom or dormant copper spray and a post-bloom copper spray. Zinc and manganese, if the latter is necessary, can be added to the pre-bloom spray.

Fertilizer Applications On Heavy Soils

On heavier soils it is usually customary to use two instead of three applications of fertilizer. This does not change the basic ratios for the year, however.

Muck Soils

No special recommendations for these soils are being made at this time as they present many peculiar problems which can best be settled by considering the individual grove properties.

General Discussion

It is not to be inferred that this represents the only possible good program, and there may be others which will eventually be found to be much better. In fact, if we do not modify this program from time to time we probably will have been negligent in our work. The main value of the program given here is that it has been thoroughly tried both experimentally and practically and found to be sound both as to production of large amounts of high quality fruit and also for the maintenance of a grove in excellent condition over an indefinite period of time. Many of the details of this program have developed out of our constant contact with growers' difficulties. Inevitably, most of our visitors are having difficulties of some kind and we have attempted to analyze those difficulties that are continuously reported and so adjust our recommendations as to prevent their occurrence. Most of these difficulties are due to variations from the principles laid down in this paper; failure to put on oil at the proper time resulting in excessive scale buildup or poor fruit color; failure to use sufficient zinc in a spray; resulting in poorer crops and often in green Valencias; using too much nitrogen in proportion to the other elements in the fertilizer such as changing a 3-6-8-2-1-½ to something like a 6-12-16-2-1-½, which has been a common error; failure to use adequate soluble magnesium; applying excessive amounts of dolomite with the result that the pH rises to 6.5 or even higher; and many other troublesome problems have been covered in this program.

I know that many are going to be aghast at the idea of one fertilizer and spray program for all sandy soils. We have found, however, that it works on all varieties of oranges, grapefruit, and tangerines; and we have found so little advantage in slight variations for individual varieties that we have come more and more to the conclusion that a program for citrus on a particular soil is much more effective than a number of varietal programs. We are, for instance, growing Valencias side by side with Pineapples, using the same fertilizer and spray program and only varying the fertilizer poundage according to the size of the crop. This has given as good results as any program we could devise for these varieties individually so why complicate the matter by having two programs. This is heresy as far as the older ideas are concerned but has a sound basis. When groves were deficient, needed impurities applied incidentally in fertilizer were likely to bring on totally unexpected reactions, as, in Valencias, a sudden freak flush of growth resulting in green fruit. On the contrary we have found that the consistent use of a program that does not allow trees to become markedly deficient avoids all of these freak reactions, and we need no longer worry about adjusting every individual application to a given variety.

The foregoing discussion is strictly in the form of a progress report rather than a final answer. As the research work develops, modifications will be reported for incorporation into the recommendations just as we have been revising the Better Fruit Program each year. In view of the fact that our present knowledge of citrus fertilizers has been developed largely in the last 10 years, it would be unreasonable to believe that anything like a final answer could be given at this time; new deficiencies will probably appear, changes in available materials will necessitate changes or modifications in the recommendations, and the changing condition of the groves themselves may also modify the need for certain elements. It will be our aim, however, to modify these recommendations whenever the research work shows that changes are desirable and sound so that you in turn may apply the results of current research work to your grove.

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Striking Example Of What Price Ceilings Have Done

Yes, price control works. The Bureau of Labor Statistics show that the retail prices on food items controlled under general maximum regulations rose only 4.1 percent between May, 1942, and May, 1943, whereas food items not yet under control rose 74.4 percent during the same 12-months period.

Foods which were placed under control after general maximum price regulations rose 34.7 percent during the priod, most of the rise occurring prior to the time price regulations became effective for these commodities.

Commodity prices are now seeking normal levels under rigid enforcement of price ceilings.

The LYONIZER

Department

COMPILED BY THE LYONS FERTILIZER CO.

Reports of Lyons Field Men . . .

POLK AND HIGHLANDS COUNTIES

J. M. (Jim) Sample

As a result of continued rains, groves generally are in splendid condition in this section of the state. Cover crops are being cut down, either with disc or plow, and fire guards are being cut around all groves where wild fires might become a hazard. Most growers are already making plans for their fall fertilizer application well ahead of time due to labor and transportation difficulties. It now appears that practically all groves will receive the fall application in October in this section, and this is advisable not only because of the labor situation but also to supply nitrogen that was leached away by heavy rains of the past few months. Much activity has been shown by buyers in pre-season fruit deals, and most shippers feel that the season will open about Oct. 1 to 15. A new infestation of rust mite is under way now and control measures are being applied.

SOUTHWEST FLORIDA

F. W. (Felton) Scott

Citrus crops are sizing up very nicely especially grapefruit which is very light in this section. Rust mites are very active and adverse weather conditions have made it difficult to bring them under control. There is some activity among the buyers and some crops in the territory have been sold at good prices. Vegetable growers are being delayed in their fall plantings by heavy rains which makes it impossible to get in the fields for necessary work. A delay of getting land in shape and the uncertainity about what the federal governmental agencies will do to clear up price ceiling situation, coupled with the possibility of a shortage in containers is creating much dissatisfaction among growers, and it now appears we will have a curtailment in our vegetable crop acreage. Growers feel that they are entitled to have some definite information regarding these subjects. At present a few fields of celery, pepper, eggplant and tomatoes have been set with the bulk of the crop yet to be planted.

NORTH CENTRAL FLORIDA

V E. (Val) Bourland

Citrus groves throughout this section are in splendid condition at the present time. Growers have been busy for the past couple of weeks getting their cover crop under control, and now they are beginning to think about the fall application of fertilizer. It appears that this application will be moved up thirty days this fall. Rust mite have been extremely active, but most growers have this pest under control. Some oil spraying is still being done. There is some activity among fruit buyers and some crops are being sold. Vegetable growers are preparing their fields for fall planting and around Winter Garden some plants have been set out. Every indication is that we will have almost a normal vegetable acreage in this section. Rainfall has been heavy and has retarded work to some extent in both the citrus and vegetable operations over all of the territory.

WEST CENTRAL FLORIDA

E. A. (Mac) McCartney

Our fall fertilizer application will get under way in this territory during the early part of October and it now appears that we will be through with this operation by the middle of November. There are several reasons for this early application, such as labor being needed for fruit picking and packing later in the season, but furthermore we have had unusually heavy rains this summer and an early fall application will supply nitrogen that is now deficient. Growers have their properties in very good shape and some oil spraying is being done at this time to clean up scale infestations. Some fruit has been sold at good prices and there is a general feeling of optimism throughout the territory. Vegetable growers are preparing their land for fall plantings and while we will have a reduction in acreage under cultivation we will have plantings of all general varieties of vegetables usually grown in this section.

BUY UNITED STATES WAR BONDS AND STAMPS

HILLSBOROUGH AND PINELLAS COUNTIES

C. S. (Charlie) Little

Our fruit crop in this territory is spotted. By this statement we mean that some groves are carrying a very nice crop of fruit while other properties have what is considered a light crop of fruit. However, since we have cut our cover crops it is evident that we have more fruit than was originally thought. The quality is generally good, but there is some melanose which we understand is very general over the entire belt this year. Our groves are in good condition and have made a very splendid growth during the summer months. Some groves are now putting out another flush of growth. There is only a small acreage of vegetables growing in this section but practically everyone is planting or preparing to plant a home garden. There is also considerable interest in poultry and livestock in the section with most everyone is making an effort to produce sufficient food for home consumption.

Winter Cover Crops...

By W. E. STOKES
Agronomist, Florida Experiment Station

Winter cover crops are planted in the fall of the year. They grow during the fall, winter and early spring and cover the land, catching and holding water, preventing washing and blowing of soil, and leaching away of valuable plant food material.

After winter cover crops are grown and turned back to the soil they add organic matter and return to the soil all the plant nutrients which they have taken out of the soil. In addition, if the winter cover crop grown is a leguminous one such as Vetch, Austrian peas, Blue Lupine, or clovers, nitrogen is actually added to the soil, since the legimunous crops have the power through bacteria in the nodules on the roots, of taking nitrogen out of the air in the soil and depositing it in the nodules as well as the various parts of the plant.

Since commercial mineral nitrogen, as for instance that found in nitrate of soda, sulfate of ammonia, and other mineral nitrogen fertilizers, is severe on account of its use in war industries for manufacture of munitions, farmers likely will not be able to buy all of the mineral nitrogen they will need. Therefore, it is a good idea to grow some of your nitrogen by planting winter legume cover crops this fall, and turning these crops back to the land this spring in time for spring and summer planted row crops to make use of the nitrogen from the cover crop.

Where you wish to protect land by having a crop growing on it during the winter and to have a crop for grazing the winter and spring but do not care about adding nitrogen to your soil through the cover crop, oats or rye rather than Austrian, Hairy Vetch, or Blue Lupine can be used.

In growing winter cover crops there are a few things you want to remember and one of the most important is that these crops have to be fed as we feed cotton, corn, and tobacco, and by feeding we mean using fertilizer. Second, remember that Austrain peas, Hairy Vetch, and Blue Lupine seed have to be innoculated before planting unless you grew these crops on the land last year and the plants thus grown were well innoculated as evidenced by the fact that plenty of nodules were on the roots. Third, winter cover crops can be planted from the middle of October to the last of November and even into December, but do not risk too much December planting.

Fertilizer should be applied ahead of planting winter legumes and ahead of or at planting time of oats or rye. A good fertilizer to use is 300 to 400 pounds per acre of a 0-14-10, or 300 to 400 pounds of superphosphate and 50 to 75 pounds of muriate of potash per acre, respectively.

Oats should be seeded at the rate of about 2 bushels per acre, and, if rye is used, seed it at the rate of 1 bushel per acre.

The best oats for northwest Florida are Quincy No. 1 and Quincy No. 2. If these oats are not available, Hastings 100 bushel and Appler are both good. For central Florida, Fulghum, Florida Black oats, and Fulgrain are good.

The best ryes for Florida are Florida Black, also known as Georgia Black, and the Abruzzi.

In the case of seeding winter legume cover crops you have no choice of varieties. The crops are Hairy Vetch, 20 to 30 pounds per acre, Austrian peas, 30 to 40 pounds per acre, and Blue Lupine 50 to 100 pounds per acre.

In conclusion, we urge you to take advantage of winter cover crops in so far as possible. These crops will protect your land, add organic matter and nitrogen to your soil, furnish grazing, if needed, except for the Blue Lupine which is not good for stock, and, finally, the crops you grow following the winter cover crops will usually yield much better crops.

Plant a winter cover crop!

Victory gardeners should save all material that will rot — grass clippings and leaves raked from the yard, weeds, any vegetative matter —and use it on the garden. Burning such materials destroys valuable organic matter and plant foods. The materials can be used as a mulch to help keep root-knot in check, says J. R. Watson, Florida

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Canned fruit juice should be stored in a cool, dark place.
